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A STUDY OF PSYCHOLOGICAL MEASURES CORRELATED TO PERFORMANCE INDICES OF UNIVERSITY ATHLETES

by

DEBRA A.C. HAYDOCK

A THESIS

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Date Oct. 9/85

DEDICATION

This project is dedicated to my late grandmother, Mrs. Alice Wight and to my brother Randall.

ABSTRACT

Correlations between scores on four scales of the Test of Attentional and Interpersonal Style, (TAIS), a "personality" test, and actual performance data for a group of university athletes were examined. Attempts were made to identify which of four selected scales of the TAIS were most significantly related to the individual performance indices normally used during basketball and volleyball games.

The TAIS was administered to 42 intercollegiate varsity female (N=21) and male (N=21) athletes. The data on each subject's athletic performance was obtained from the performance statistics for regular league games played during the 1984-85 season. Pearson product-moment correlation coefficients were obtained for a number of bilateral correlations.

The two effective attentional foci (BET and NAR) tended to correlate with the positive performance indices (e.g. total points in basketball or kills in volleyball), and the two ineffective foci (OET and RED) tended to correlate with the negative indices (e.g. turnovers in basketball or errors in service in volleyball).

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Table of Contents

Chapter — Page

I. INTRODUCTION 1

Nature and Scope of the Study 2

Statement of the Problem 5

Hypotheses 5

Definition of Terms 6

Delimitations 8

Limitations 8

II. Review of Literature 10

Introduction 10

Definition of Attention 10

Disciplinary and Theoretical Approaches to Attention 12

Broadbent's Filter Theory 14

Easterbrook's Hypothesis 16

Nideffer's Model of Attention and Attentional Style 17

Equivocal Results of the TAIS Studies 19

Summary 20

III. Methods and Procedures 22

Thesis Purpose 22

Subjects 22

Instruments 22

1. The Test of Attentional and Interpersonal Style (TAIS) 22

2.Performance Charting 24

Collection of Data 27

Treatment of Data 27

IV. Results and Discussion 28

A. Female Basketball 29

a) Expected Relationships: 30

1. BET/PF, r=.50 30

2. OET / TP, r=.59 30

3. NAR / TP, r=.70 31

4. NAR / RB%, r=.72 31

b) Unexpected Relationships: 31

1. OET / PF, r=-53 31

2. RED / FT%, r=.78 32

3. RED / TP, r=.52 32

4. RED / RB%, r=.52 33

Male Basketball 34

a) Expected Relationships: 34

1. BET / TO, r=-.60 34

2. OET / FT%, r=-.57 35

b) Unexpected Relationships: 35

1. OET / FG%, r=.49 35

Female Volleyball 36

a) Expected Relationships: 37

1. BET / ACES, r=-.51 37

2. NAR / OUT, r=.50 37

3. NAR / SUM, r=.51 37

4. BET / BLOCKS, r=-49 38

5. NAR / CHOICE3, r=.48 38

6. NAR and ERR/SERV., r=-.48 38

Male Volleyball 39

a) Expected Relationships: 40
1. OET / ACES, r=-.71 40
2. OET / CHOICE2, r=-.60 40
3. OET / CHOICE1, r=-.50 40
4. NAR / ERR%, r=.51 41
5. NAR / KILL EFF., r=-.68 41
6. NAR / BLOCKS, r=-.54 41
b) Unexpected Relationships: 42
1. OET / BLOCKED, r=-.53 42
2. OET / ERR, r=-.74 42
3. NAR / KILL%, r=-.67 43
Overview 43
V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS 47
Bibliography 50
Appendix A 55
A. In Female Basketball: 55
B. In Male Basketball: 55
C. In Female Volleyball: 55
D. In Male Volleyball: 56
Appendix B 57

Chapter I

INTRODUCTION

Sport psychologists, coaches, and physical educators now recognize the significance of mental preparation, as well as physical training, in programs designed to achieve optimal athletic performance. One of the major concerns is how one's mental abilities relate to actual performance. The ability to control mental processes is basic to performance success (Nideffer, 1981). Research has shown that hypnosis, Transcendental Meditation (TM), Zen, mental rehearsal etc., can be beneficial in teaching athletes how to control their mental processes. Control of mental processes influences the control of physical abilities, and can increase one's chances of reaching potential during athletic performance.

In order to effectively control mental abilities, it is important to determine those specific elements which affect mental proficiency, and in turn, be able to provide appropriate psychological intervention to enhance an athlete's ability to cope with the cognitive demands involved in athletic tasks. The situation, in itself, combined with various intrapersonal factors will together, affect one's behavior at any point in time and the resultant performance will be influenced by situation-factor interactions.

One task, then, is to identify the abilities of each individual, the situational demands the individual athlete faces, and to institute a training program specifically

adapted to meeting those demands.

The existence of individual differences in mental abilities is generally acknowledged in the literature. The effects arousal has on athletic performance is also widely recognized. Nideffer (1978b) used a triangular diagram to depict the relationship between arousal, stress, and anxiety and indicated that stressful conditions result in physiological changes (increases in arousal) and psychological alterations (increases in anxiety). Although an increase in arousal does not necessarily imply an increase in anxiety, Nideffer contends that, as arousal increases, attention does become less flexible, less broad, and more internally directed (Nideffer, 1981). Nideffer (1980), thus, hypothesized that attentional processes can be modified by reducing the level of arousal. This arousal-attention relationship, proposed by Nideffer, also suggests that attentional control can be maintained as long as arousal is controlled.

This thesis examines athletes' attentional abilities, athletes' capacities to control attentional processes, and the influence the abilities and capacities have on actual athletic performance.

Nature and Scope of the Study

According to Nideffer (1976), no variable is more central to performance than the ability to direct and control one's attention. The study of such cognitive

processes is therefore important in understanding factors that affect performance.

As an instrument, The Test of Attentional and Interpersonal Style (The TAIS) provides information on each individual's attentional "style" or the customary manner in which the individual normally attends to events, people, or objects in their normal environments. One's style of attending to things was hypothesized by Nideffer (1976) as being dependent on two major dimensions: the "width" and "direction" of one's attentional focus. Width refers to the number of stimuli one can attend to in a stimulus field, while direction refers to whether the person's attention is directed toward internal or external stimuli. The TAIS, thus, delivers information on a person's weaknesses and strengths in four major attentional focuses:

1. Broad-External - BET - (i.e. attending to a large number of stimuli in one's external environment).

2. Broad-Internal - BIT - (i.e. attending to a large number of internal thoughts or feelings).

3. Narrow-External - NAR - (i.e. attending to one or just a few external stimuli).[1]

4. Narrow-Internal - NAR - (i.e. attending to one or just a few internal thoughts or feelings).

Nideffer (1976) takes the position that everyone has a

---

[1]On the basis of his initial research, Nideffer (1976) collapsed NARROW EXTERNAL and NARROW INTERNAL into one scale (i.e. NAR - narrow focus of attention) because his results failed to support any directionality.

pre-dilection to one or a combination of these four focuses of attention and this customary style of attention tends to be a characteristic of each person.

In addition to the individual's attentional style, each sport has different and specific attentional demands (Nideffer, 1981). For instance, sports requiring athletes to plan or analyze information demand essentially a broad internal focus of attention; while athletic activities involving rapid changes in action or reaction (e.g. hockey) require the athlete to be capable of a broad external focus. The appropriate focus of attention should enable one to respond, when necessary, to the relevant cues. It is on this basis that one can explore the relationship between an athlete's attentional style and the attentional demands of his or her sport, particularly in terms of whether or not conflicts exist between style and demands.

According to Nideffer (1976), one can be distracted by the environment (OET), distracted by ones' own thoughts (OIT), as well as overly-narrow or reduce attention (RED). These particular scales of the TAIS reflect ineffective focuses of attention; that is, they provide an indication of the ease with which one can shift from one attentional focus to another (Nideffer, 1981). If a person is confused and/or not attending to the correct cues, there could be an information overload and a loss of attentional effectiveness. The greater the information overload, the greater the likelihood of performance error.

This thesis examines how The Test of Attentional and Interpersonal Style (the TAIS), as developed by Nideffer (1976), may be used to provide an understanding of why or how athletes perform the way they do.

Statement of the Problem

The purpose of this study is to examine whether or not certain psychological measures from a "personality" test (i.e. the TAIS) correlate to actual performance data in a group of university athletes. Of particular interest is an attempt to identify which of four selected scales of the TAIS are most significantly related to the individual performance indices normally taken during basketball and volleyball games.

In the exploratory stages of this study, it was assumed that an athlete's attentional style will be directly related to his or her actual performance. It therefore, seems necessary, to identify which of the psychological measures and which of the actual performance measures, are most related to each other.

Hypotheses

It is hypothesized in this study that:

1. Certain attentional sub-scales of the TAIS (i.e. the BET, OET, NAR, and RED scales) will be significantly correlated to certain kinds of performances in basketball and volleyball. Specifically, that:

a. BET and OET will significantly correlate to performances identified as requiring a broad-external focus of attention.

b. NAR and RED will significantly correlate to performances identified as requiring a narrow focus of attention. The above hypotheses are restricted to looking only at the "bandwidth" dimension of attention in sport since most performance situations require athletes to broaden or narrow their attentional focus. For instance, for successful performance, free-throw shooting in basketball or serving in volleyball obviously require a narrow focus of attention (NAR) while passing or dribbling in basketball or attacking in volleyball require a broad focus of attention (BET).

Definition of Terms

TAIS - Robert M. Nideffer's Test of Attentional and Interpersonal Style.

Attentional Style - How one habitually attends as reflected by the strengths and weaknesses of the two attentional dimensions; width and direction.

Attention - is a process whereby the person preferentially responds to a stimulus or stimuli.

BET (broad external focus of attention) - High scores on this scale are obtained by individuals who describe themselves as being able to effectively integrate many environmental stimuli at one time.

OET (Overloaded by external stimuli) - The higher the score, the more individuals make mistakes because they become

confused and overloaded with external stimuli.

BIT (Broad internal focus of attention) - High scores indicate individuals see themselves as able to effectively integrate ideas and information from several different areas. They see themselves as analytical and philosophical.

OIT (Overloaded by internal stimuli) - The higher the score the more mistakes individuals make because they become confused and overloaded with internal stimuli.

NAR (narrow focus of attention) - The higher the score, the more effective individuals describe themselves in terms of ability to narrow attention (e.g. to study or to read a book).

RED (reduced attention) - High scores reflect an ineffective focus of attention both externally and internally due to the narrowing of attention too much.

INFP (Information processing) - High scorers tend to process a great deal of stimulus information. Their perceptual-cognitive worlds are busy.

BCON (Behavior control) - A high score indicates the individual tends to be somewhat impulsive. In addition he has engaged in behavior that could be considered anti-social though not necessarily harmful.

CON (Control scale) - A high score indicates the individual is in control of most of the situations, interpersonal and otherwise, he finds himself in. It also means he attempts to gain control of situations.

SES (Self-esteem scale) - The higher the score, the more highly the individual thinks of himself.

DEP (Depression) - High scores indicate that the person gets down on him or herself, feels guilty or ashamed and a burden to others. Often the condition is temporary. High is 8 or above.

P/O (Physical orientation) - A high score indicates the individual participates in and enjoys competitive athletics.

OBS (Obsessive) - A high score indicates the person has a tendency to ruminate and worry about one particular thing without any real resolution or movement.

EXTR (Extroversion) - A high score indicates the individual is warm, outgoing, needs to be with other people, is the life of the party.

INTR (Introversion) - A high score indicates the person likes to be alone, enjoys quiet thoughtful times, and avoids being the center of attention.

IEX (Intellectual Expression) - A high score indicates the person expresses his thoughts and ideas to other people.

NAE (Negative affective expression) - A high score indicates the person expresses his anger and negative feelings to others.

PAE (Positive affective expression) - A high score indicates the person expresses his feelings of affection to others in both physical and verbal ways.[2]

Delimitations

This study and its' results are limited to:

1. Male and female university basketball and volleyball players.
2. One season of performance.
3. Only four of the TAIS subscales.

Limitations

The only major limitation of this study is the assumption that particular performance situations require only a broad or narrow focus of attention. Such may not

---

[2] Robert M. Nideffer, Journal of Personality and Social Psychology. 1976, 34, No.3, 397.

always be the case rather, the assumption is that generally one or the other would seem to be necessary.

Chapter II

Review of Literature

Introduction

The purpose of this literature review is to provide 1) an understanding of how the process of attention is viewed from a theoretical standpoint, 2) what implications such viewpoints have for understanding the nature of attention in task performance, and 3) the connection Nideffer attempts to make between attentional style and performance, and the relevance of his Test of Attentional and Interpersonal Style (the TAIS) in making this connection between theory and practice operational for both researcher and coach.

Definition of Attention

The range of definitions for the term Attention is representative of the diversity of theoretical perspectives brought to bear on the topic. Attention can be defined in terms of content, process, and/or in terms of outcomes. James (1890), defined attention as:

> "...the taking possession by the mind, in clear and vivid form, one out of what seems several simultaneously possible objects or trains of thought. Focalization, concentration of unconsciousness are of its essence. It implies withdrawal from some things in order to deal effectively with others and is a condition which has

> a real opposite in the confused, dazed, scatter-brained state which in French is called distraction..."

(as cited by Bakan, 1966, p. 5).

Chaplin (1975) defines attention as:

> 1. "The process of preferentially responding to a stimulus or range of stimuli. 2. The adjustment of the sense organs and central nervous system for maximal stimulation. 3. A state of sensory clearness with a margin and a focus."

Gibson & Rader, (1979, p. 3) state that,

> "Attention relates perception to action and to a person's needs and motives. Attention points to perceiving as an active process, a process of extracting information from ongoing events in a selective, active, economical way."

Kahneman (1973, pg. 12), attempts to integrate the intensive and selective aspects of attention. He states emphatically that:

> "The intensive aspect of attention is identified with effort, and selective attention is viewed as the selective allocation of effort to some mental activities in preference to others. Because of the connection between effort and arousal, physiological measures of arousal can be used to measure the exertion of effort. Some types of information-processing activities can be triggered

solely by an input of information. Others require an additional input of attention or effort. Because the total quantity of effort which can be exerted at any one time is limited, concurrent activities which require attention tend to interfere with one another."

Though attempts to define attention tend to revolve around the writer's disciplinary perspective, as discussed in the following section, the general thread running through all these attempts is that attention involves "the mind being directed toward something specific" (Gibson and Rader 1979, p. 7).

Disciplinary and Theoretical Approaches to Attention

The various definitions of attention reflect and arise from differences in disciplinary and theoretical perspectives. For instance, physiology versus psychology, information processing versus differential psychology models each perceives attention from a particular viewpoint which is influenced, if not colored by various biases of that discipline. One can categorize different approaches to attention under two distinct heads: structural versus capacity models. Such a distinction can be seen to represent two conflicting perspectives which depict the underlying attentional processes. The structural models suggest that the filter mechanism which permits a selective admission of information for further processing limits the attentional

ability of the individual (Kahneman, 1973). Keele (1973) discredits the assumption that these structural models provide adequate explanation in terms of attention being required prior to perception. However, he agrees with the model's account for ones' ability to selectively attend to a signal when he states that:

> "...sensory information from ignored sources is either filtered out or attenuated prior to memory contact." (p. 150)

The capacity models emphasize three major concepts, 1) capability, 2) potentiality and 3) maximum producing ability (Kahneman 1973; Moray 1967). This viewpoint indicates that attention has a restricted capacity and, if sufficiently biased to one signal, then there would be no available capacity to process another stimulus simultaneously.

As Gibson & Rader (1979, p.6) have said, "Attention is a relationship between process and task, an adaptive relationship between performing and procuring information to guide and support that performance." Despite the differences and discrepancies existing in theory, it appears only logical that individual differences (inter and intra) exist, and greatly affect how attention is to be conceptualized.

Keele (1973, p. 167) said:

> "Another promising field is that of individual differences. As is quite apparent, there are vast differences in mental and physical abilities among different people. Some are good artists; some are

> good athletes; some are skilled typists; some are brilliant mathematicians. These differences are due in part to differing interests and motivations, but they are undoubtedly also due in part to differing capacities in the various information processing tasks."

Whether the individual is introvert or extravert, a child or adult, hockey player or gymnast, one's perception and attribution combined with situationally - determined experiences should be carefully examined. The various conceptual and therapeutic approaches to attention are complementary to each other and not mutually exclusive. Kahneman (1973) recommended that both structure and capacity models be included and examined in any thorough investigation of attention. Kahneman further commented that,

> "Neither model is adequate alone, but each captures some important aspects of cognitive activity." (p.12)

Broadbent's Filter Theory

Landers (1982) wrote that the usual way to measure attention is in a laboratory with a dual-task paradigm. He also indicated that according to Broadbent (1958), people have a limited capacity to optimally perform two or more tasks simultaneously.

Broadbent's (1957) filter theory of attention, the first complete theory of attention from an information

-processing point of view, provides researchers with revealing indications of how man usually processes information. This precision component of Broadbent's filter theory allows investigators to take a definite stance when deciding whether or not to accept or reject their hypotheses. The major feature of Broadbent's filter theory is that a selection of relevant stimuli occurs and is then cognitively processed within a limited capacity channel.

On the basis of physical features such as spatial location or tone, the selective filter serially selects information to be processed in the limited capacity channel. Any information not selected is stored in the short-term memory, located just prior to the filter. Once the initial or preceding stimuli has been cleared in the limited channel, the filter allows a new stimuli to be processed. Broadbent's model assumes serial selection prior to processing. The primary question to be posed, regarding Broadbent's model, is "How does one account for the perception of information accessed through channels to which subjects are not attending ?"

The structure of Broadbent's model appears to lack adequate explanation in terms of the contention that attention is required prior to perception; viz., the point at which attention becomes selected is yet to be resolved. If, however, attention has some kind of capacity limit as Broadbent (1957) suggests, and if an athlete is to perform at his or her maximal potential utilizing a vast amount of

that capacity, then virtually little, if any, residual attention can be distributed toward a secondary task. Assuming this to be the situation, interference in performance of the secondary task would occur (Klein, as cited by Reis and Bird, 1982).

Easterbrook's Hypothesis

Easterbrook (1959) attempted to explain the effect of arousal on the allocation of attention. He hypothesized that as arousal level increases a narrowing of attention tends to occur. The hypothesis that there is a gradual reduction in one's ability to process peripheral cues as arousal increases has received support from studies of narrowing of attention (Broadbent, 1971; Hockey, 1970; Kahneman, 1973; Teichner, 1968, as cited by R. Hockey, 1984, p.467).

It is obvious that there are two suppositions within Easterbrook's hypothesis which convey an inadequate theory. Firstly, the implication that concentration is highest when arousal is high, and secondly, the suggestion that the difficulties of the under-aroused or drowsy subject result from an excessive openness to experience (Kahneman, 1973).

Eysenck (1982) indicated that a dual-task paradigm is essentially the most direct assessment of Easterbrook's assumptions. Naturally, when arousal levels are high performance on a secondary task would be impaired.

A review of sport studies which use different tasks and stressors support Easterbrook's hypothesis (Landers, 1982);

i.e., the hypothesis that performance is impaired on the peripheral or secondary task.

Nideffer's Model of Attention and Attentional Style

According to Landers (1982), the questionnaire that measures attention which most resembles Easterbrook's notion (1959) is that of attentional style, proposed by Nideffer (1976b). Attention, for Nideffer (1976) is "... the ability to direct our senses and thought processes to particular objects, thoughts, or feelings". Nideffer does not regard attention as a broad-narrow continuum but, rather, as a concept composed of two dimensions; width (broad-narrow) and direction (internal-external). How one habitually attends as reflected by the strengths and weaknesses of the two attentional dimensions; width and direction, has been used as an operational definition of attentional style.

The major theoretical notion supporting the concept of attentional style as an individual difference variable, is based, in large part, on Nideffer's TAIS, and its related theory (Nideffer, 1976:Reis and Bird, 1982).

Nideffer's concept of attentional style is closely related to Easterbrook's ideas of peripheral narrowing of attention. In general, performance weakens when working on two tasks at the same time as a result of a reduction in one's ability to process peripheral cues.

Attentional style has been considered a stable personality trait and, thus, varies with each individual.

The implication here is that each person has a habitual style of attending to stimuli. For this purpose, the TAIS developed by Nideffer (1976) with six attentional scales is a measure for identifying attentional styles. To paraphrase Van Schoyck & Grasha (1981), as cited by Landers (1982), the TAIS' rationale is described as follows:

> "As a general rule, as situations become more complex and change rapidly, a participant will need an externally focused attentional style. Thus, a linebacker in football might need a broad external focus, whereas a tennis player or baseball batter might need a narrow focus to perform well. Conversely, as the demand for analysis or planning increases, the need for an internal and reflective attentional style becomes apparent. Thus a weight lifter or shot putter would need a relatively narrow internal focus, whereas, a quarterback in football determining what play to call might need a broad internal focus. (p.150)."

TAIS(1976), developed by Nideffer, allows the sport psychologist, the coach, and each athlete to gather important attentional data suited for sporting performance. Once the relevant attentional data has been collected, the sport psychologist can make an assessment and/or formulate a plan of management. Above all, the TAIS is essentially a counselling instrument. Accordingly, this validity check is an attempt to further explore whether or not one can predict

performance.

Equivocal Results of the TAIS Studies

The purpose of this section is to review the literature related to the construct attentional style and the TAIS.

Van Schoyck and Grasha (1981), tested 45 male and 45 female tennis playing volunteers, with varying skill levels using the T-TAIS, a modified tennis-specific version of Nideffer's TAIS. The authors reported that the T-TAIS, a sports event specific measure of attention, is a highly reliable test and thus a very good estimate of attentional style compared to the general TAIS.

In a study of 78 male and female college students, Reis and Bird (1982) conducted an investigation to test whether self-reported measures of broad and narrow attentional styles could predict cue-processing ability on a task requiring the ability to process peripheral cues.The results illustrated marginal support for the predictive utility of the TAIS in relating attentional style to performance requiring the processing of peripheral cues.

In a recent study, Vallerand (1983) found that male basketball players with different decision making (DM) capacities did not differ on the TAIS. The results of this study supported Van Schoyck and Grasha's findings that the TAIS is unable to detect differences in attentional style between athletes of different skill levels.

Summary

Mental preparation is an important part of training and preparing an athlete for competition; and attentional control is an essential part of that preparation. Competent attentional control in its totality begins with assessing the base level of an individual's attentional, control, and interpersonal capacities, (or the combined effect), and proceeds to the actual skill evident during competition. The tasks for the sport psychologist is to (1) identify how each individual essentially focuses his attention, (2) to diagnose the appropriate attentional demands relative to the sport, (3) to list the situations which are most likely to interfere with optimal performance during competition, and then, (4) to provide the psychological intervention necessary to enable each athlete to progress consistently toward self-control.

In light of Reis and Bird's (1982) finding that subjects classified as broad attenders should perform better on a task requiring peripheral processing than subjects identified by the TAIS as narrow attenders, the authors have attempted to further arguements for the existence of predictive validity on the TAIS. In arguing that the criterion used for identifying experimental subjects was not a valid reflection of the dependent measures, that is, narrow and broad attentional styles, the authors have failed to maintain the original TAIS format, and in turn decreased the reliability and validity of the results obtained.

Confronted with the TAIS and it's questionable predictive utility, together with Reis and Bird's (1982) findings as noted above, the validation of selected attentional scales correlated with performance indices in basketball and volleyball to determine how accurate Nideffer's test identifies Broad and Narrow attenders is to be undertaken in this thesis.

Chapter III

Methods and Procedures

Thesis Purpose

The purpose of this study was to determine the extent to which subject scores on the TAIS correlated with the athlete's actual performance during the 1984/85 season.

Subjects

The subjects were 42 varsity basketball (N=21) and volleyball (N=21) players (21 female, 21 male), ages 17-23 years, from the University of Alberta Golden Bear and Panda intercollegiate teams.

Of the original 47 subjects that were available for this study, 5 did not complete the season and therefore were not included in the results of the study.

Instruments

1. The Test of Attentional and Interpersonal Style (TAIS)

The TAIS was developed by Robert M. Nideffer in 1976. His major purpose was to develop a questionnaire to measure certain attentional and personality characteristics concerning the prediction of performance under various levels of difficulty in daily life (Nideffer, 1977). The TAIS contains six attentional scales, two control scales, and eight interpersonal

scales. All of which are interpreted in terms of how effective an individual may be in performance situations. Control of the width and direction of one's attention is dealt with in the first six scales. The extent to which the person normally processes information and the extent to which they control their own behavior is dealt with in the middle two scales and the remaining nine interpersonal scales are helpful in predicting how a person will react in those interpersonal circumstances that occur in various performance situations.

From a large item pool, seventeen conceptually independent scales were developed. These scales were made up of 144 behavioral-oriented items which describe an individual's ability to function in discreet and environmental situations. Test subjects rate, (on a 5 point scale from "never" to "always") their responses to various normal daily life situations. Each scale is calculated and becomes a part of the person's attentional and interpersonal profile. The score obtained on each scale by each person is assumed to be based on an interval scale of measurement. Interval scales of measurement require equality of units along that scale.

Nideffer (1976) has reported research studies demonstrating the TAIS to be repeatedly reliable as well as having construct and predictive validity. This

statement is supported by the findings of Reis and Bird (1982), Landers and Courtet (1979), and Furst (1981). The latter study identified the beneficial usage of a behavioral measure to preselect subjects with regard to attentional flexibility, as opposed to those questionnaires currently available.

2.Performance Charting

Information on each subject's athletic performance over the season was obtained from charting the performance statistics of each team during the season.

For the purposes of this study, the performance statistics for the season's games were structured under two distinct headings; 1) The Panda and Golden Bear volleyball teams and, 2) The Panda and Golden Bear basketball teams.

The Panda and Golden Bear Volleyball Performance Criteria

For this study, as defined by the Canadian Volleyball Association, the performance criteria for volleyball were as follows:

Total Attacks - Each time the ball is put over the net by U. of A. team.

Kills - Points or side-out immediately won in an attack (i.e. no play by the defense).

Cont - Winning of the rally by U. of A. team after continuous play (i.e. not an immediate win of the point).

Out - When U. of A. team hits the ball out of bounds (i.e. an error).

Block - Whenever an attack is intercepted at the net by the opposition resulting in a point or side-out. (i.e. a negative outcome).

Kill% - number of kills divided by number of attacks multiplied by a hundred.

Error% - number of outs + number of blocks by the opposition divided by total number of attacks multiplied by a hundred.

Kill Efficiency - Kill% - Error%.

Blocks - When U. of A. team intercepts an attack by the opponent at the net which results in a point or side-out.

Digs - Are the successful retrievals of the opposing team's attack.

Aces - Are services resulting in an immediate point.

Err - Are services resulting in a side-out.

Service Reception

#3 - Setter has 3 places to set ball (i.e. a perfect pass to setter).

#2 - Setter has 2 places to set ball (i.e. setter has less options because pass is less than perfect).

#1 - Setter has 1 place to set ball (i.e. setter has no options because pass is poor).

#0 - Setter unable to set ball (i.e. someone else is forced to set ball).

3.00 system - (#3)(3) + (#2)(2) + (#1)(1) divided by number of attempts.

Error% - (#3) - (#0) divided by number of attempts.

#2 + #1 - Sum of #2 & #1

The 1984-85 Basketball Performance Criteria.

FG%age - Field goal percentage is the number of successful shots from the field divided by the number of attempts multiplied by a hundred.

FT%age - Free-throw percentage is the number of successful free-throws divided by the number of attempts multiplied by a hundred.

TP - Total points per game by each player.

R% - The number of rebounds per game by each player (i.e. total rebounds by the player divided by the number of games played multiplied by a hundred).

TO - Turnovers.

PF - Personal fouls.

The performance criteria data for the teams in each sport resulted in a "number" for each player in each category. It was this "number" (representing a season - long performance indicator) that was correlated to the person's TAIS scale score. The performance criteria "numbers" obtained on each subject in this study are based on a ratio scale of measurement. That is to say, they are "real" numbers in that a zero score represents

a complete absence of the characteristic and that all the numbers are equal units. For example, the difference between 21 and 23 is exactly the same as the difference between 37 and 39.

Collection of Data

The data for this study was obtained by administering the TAIS to 42 intercollegiate varsity athletes at the University of Alberta. The athletes, female (N=21) and male (N=21) were players from the Panda and Golden Bear Basketball and Volleyball teams of the 1984/85 competitive season. In addition, data from the charting of each player's performance during the regular season league games were received from the team statisticians. Thus, for each athlete, 18 TAIS scores together with performance scores (7 for basketball and 19 for volleyball) were used in the correlational computation.

Treatment of Data

The data was analyzed using a Pearson Product - Moment intercorrelational matrix to identify any substantive correlations. A correlation coefficient between basketball and volleyball performance indices and selected TAIS attentional scales was calculated on the AMDAHL 5860 computer, using a program called the Michigan Interactive Data Analysis System (MIDAS).

Chapter IV

Results and Discussion

The purpose of this study was to explore the relationship between selected attentional scales, as measured by the TAIS, and certain indices of actual performance; specifically, in basketball and volleyball.

There are four sections to this chapter. Each section deals with each of the four teams. Each section presents the correlational matrix generated for a team, identifies the particular correlations of interest, and then discusses these correlations.

As previously stated, this study explores the relationships between a number of attentional factors, as measured by the TAIS, and actual performance in the sports of basketball and volleyball. Because of the exploratory thrust of the study, it appeared reasonable to discuss only those relationships (as reflected by the correlation coefficients) which seemed to strongly support or reject the general hypothesis of the study. Furthermore, because of the low numbers of subjects involved, statistically defined "significance" would not seem to be a valid criteria for determining which relationships should be chosen. It was thought therefore that the relative sizes of the correlation coefficients might provide some indication of the relative strengths of the relationships. Correlation coefficient values of 0.50 or higher were taken to indicate relationships with enough strength to warrant some

discussion. The decision to use a correlation coefficient of 0.50 or higher was based on the fact that possible trends might be apparent or identifiable in this preliminary data. The ensuing discussions involve two types of relationships which indicated some strengths: (a) Those relationships which occurred and were generally expected to occur and (b) those relationships which occurred but were not expected to occur.

A. Female Basketball

TABLE 1. Female Basketball Correlation Coefficients.

	BET	OET	NAR	RED
FG%	.43	-.21	.27	.09
FT%	.00	-.03	.09	.78
TP	.43	-.59	.70	.52
RB%	.15	-.24	.72	.52
TO	.47	-.42	.42	.41
PF	.50	-.53	.48	.38

As illustrated in Table 1, several correlations were high enough for consideration (i.e. were either expected or unexpected and, therefore necessitated discussion). These were BET/PF (r=.50), OET/TP (r=-.59), OET/PF (r=-.53), NAR/TP (r=.70), NAR/RB% (r=.72) and RED/FT% (r=.78).

a) Expected Relationships:

1. BET/PF, r=.50

As stated in chapter 1, with a BET focus there is a tendency for the athlete to react rapidly and instinctively and be sensitive to surroundings. But, even more important, the athlete who is responsive to changes in the environment (i.e. on the basketball court) is likely to be unable to identify relevant cues. For instance, one may miss signals and forget game conditions and/or rules. The tendency to react before thinking may explain why female athletes commit personal fouls in basketball or incur penalties in situations requiring a broad external focus.

2. OET / TP, r=.59

Being easily distracted by surroundings can cause one to become overloaded and confused. Consequently, distracted players will have difficulty in a sporting event because of the large amounts of information that are received and must be dealt with. The attentional focus, as hypothesized would be associated with inadequate variability in performance and also would appear to prevent the shifting of attention from a broad to a narrow or a narrow to a broad focus as required during a game.

3. NAR / TP, r=.70

One would expect good "narrowers" to be good scorers. A narrow attentional focus is necessary for task execution. Shooting and scoring in basketball can be seen as relatively finite skills; consequently, a relationship between NAR and TP would be expected.

4. NAR / RB%, r=.72

There is a need for a basketball player to "initially" be aware of the surroundings in order to execute a rebound.

One would therefore expect good "narrowers" to be good at rebounding since a narrow focus of attention is required for specific plays. A sense of when to go in and get the ball and when to pick up the rebound is considered to be a finite skill or closed skill; consequently, a relationship between NAR and RB% would be expected.

In the sample selected for this study, it might have been due to possible chance or coincidence that the bigger players happened to show up with a NAR attentional focus.

b) Unexpected Relationships:

1. OET / PF, r=-53

This high negative correlation (r=-.53) was unexpected since one would think that a player who is overloaded by external stimuli and distracted by them would tend to be

careless in his/her movements and thus commit more fouls than the player who is not distracted by external events. No plausible explanation for this occurrence is available at this stage.

2. RED / FT%, r=.78

This high correlation between RED and FT% was unexpected. One would expect that a player who has a significantly narrowed or reduced attentional focus would be internally or externally distracted and therefore fail to perform successful free-throws compared to an equivalent player who is not "overly-narrowed" or distracted. Alternatively, if a narrow attentional focus is necessary for shooting or, scoring, perhaps female varsity basketball players are able to reduce attention and acquire a number of points by performing successful free-throws thereby increasing the correlation coefficient.

3. RED / TP, r=.52

This correlation was unexpected because one would conclude from this relationship that a player who overly-narrows or reduces his/her attentional focus would be either internally or externally distracted and not shift attention when necessary compared to the player who is not concentrating too much on irrelevant stimuli. No explanation

is possible.

4. RED / RB%, r=.52

This correlation was unexpected because it appears to suggest that a player who has overly-narrowed or reduced his attention would be distracted internally or externally and not shift attention when required during a rebound as compared to the player who is not internally preoccupied. No explanation appears possible.

Male Basketball

TABLE 2. Male Basketball Correlation Coefficients.

	BET	OET	NAR	RED
FG%	.25	.49	-.44	.12
FT%	-.21	-.57	-.03	-.25
TP	-.16	.02	-.10	.14
RB%	.10	.12	-.10	.06
TO	-.60	.01	-.33	.20
PF	-.40	-.07	-.47	-.27

It can be seen in Table 2 that several correlations were high enough for consideration (i.e. were either expected or unexpected and, therefore necessitated discussion). These were BET/TO (r=-.60), OET/FT% (r=-.57) and OET/FG% (r=.49).

a) Expected Relationships:

1. BET / TO, r=-.60

Frequently, a player with a broad external focus has an awareness of what is going on around him /her during a game and would commit few turnovers. A BET focus is necessary throughout a game in order to be aware of openings, spaces, or positioning and, to react instinctively and quickly. A turnover is a relatively open skill; consequently, a relationship between BET and TO would be expected.

2. OET / FT%, r=-.57

Being overloaded and distracted by the surroundings can "psych" a player out, and cause the player some difficulty in narrowing attention. A narrow attentional focus is necessary for a closed skill such as shooting a free-throw; consequently, a negative relationship between OET and FT% would be expected.

b) Unexpected Relationships:

1. OET / FG%, r=.49

This correlation was unexpected because an athletes' being overloaded and distracted by the surroundings could interfere with the athlete's concentration and may cause errors in shooting field goals as opposed to the player who is not distracted by external events. No explanation for this correlation is presently available.

Female Volleyball

TABLE 3. Female Volleyball Correlation Coefficients.

	BET	OET	NAR	RED
KILLS	-.30	-.26	.47	.01
CONT	-.17	-.43	.45	-.27
OUT	-.30	-.22	.50	.08
BK'd	-.23	-.35	.44	-.12
BKS	-.49	-.43	.24	-.05
DIGS	-.11	-.29	.45	-.27
ACES	-.51	-.12	-.07	.07
ERR	-.36	-.35	.24	-.01
C3	-.20	-.25	.48	-.02
C0	-.27	-.34	.43	-.01
SUM	-.16	-.26	.51	.00
K%	.23	.33	.27	.28
E%	.41	.28	.17	.27
KE	-.25	.01	.08	-.04
EPS	-.01	.20	-.48	-.31

It can be seen in Table 3 that several correlations were high enough for consideration (i.e. were either expected or unexpected and, therefore necessitated discussion). These were BET/BLOCKS (r=-.49), BET/ACES (r=-.50), NAR/ERR/SERV. (r=-.48), NAR/OUT (r=.50), NAR/CHOICE3 (r=.48) and NAR/SUM (r=.51)

a) Expected Relationships:

1. BET / ACES, r=-.51

As expected, the female athletes tended to make fewer "aces" in service when they broadened their attention. A broad external focus allows one to be aware of everything going on around them. Looking at something other than the ball during service is likely to interfere with performance; consequently a negative relationship between BET and "aces" would be expected.

2. NAR / OUT, r=.50

As expected the more narrow one's attention, the fewer are the number of options in terms of the number of possible attacks. For a successful attack, a BET focus allows the player different scoring options. Frequently, a player who has decided to aim for a specific area follows through on it. However, a blocker can block the intended play and consequently prevent "last minute" changes for the attacker. Consequently, a relationship between NAR and OUT would be expected.

3. NAR / SUM, r=.51

Good narrowers are expected to be good receivers. A narrow attentional focus is necessary for task execution.

Receiving is a closed skill where a receiver zeros in on a ball and makes a pass to the setter. Therefore, a relationship between NAR and SUM would be expected.

4. BET / BLOCKS, r=-49

The female athletes tended to make fewer blocks when broadening their attention, than when narrowing their attention, and tended to focus on what was going on around them. A narrow focus is required for specific plays or task execution and one would expect good blockers to be good narrowers. Consequently, a negative relationship between BET and BLOCKS would be expected.

5. NAR / CHOICE3, r=.48

Good narrowers are expected to be good receivers and make good passes to the setter. Receiving and passing can be seen as basic and relatively closed skills, so a relationship between NAR and CHOICE3 would be expected.

6. NAR and ERR/SERV., r=-.48

Good narrowers are likely to be good servers. A narrow focus of attention is necessary for task execution. Serving in volleyball is a closed skill, therefore a negative relationship between NAR and ERR/SERV. would be expected.

Male Volleyball

TABLE 4. Male Volleyball Correlation Coefficients.

	BET	OET	NAR	RED
KILLS	-.18	-.47	-.25	-.26
CONT	-.17	-.35	-.14	-.29
OUT	.15	-.42	.17	-.30
BK'D	.12	-.53	-.18	-.37
BKS	-.13	-.16	-.54	-.29
DIGS	-.16	-.33	-.14	-.24
ACES	-.10	-.71	-.45	-.39
ERR	.09	-.74	-.13	-.43
C3	.01	-.45	-.12	-.09
C2	-.10	-.60	-.18	-.27
C1	-.15	-.50	-.01	-.11
C0	-.08	-.30	.03	-.01
SUM	-.01	-.48	-.13	-.13
K%	-.18	-.09	-.67	-.05
E%	.25	-.41	.51	.15
KE	-.25	.22	-.68	-.12
EPS	.26	.27	.01	.09

It can be seen in Table 4 that several correlations were high enough for consideration (i.e. were either expected or unexpected and, therefore necessitated discussion). These were OET/ACES (r=-.71), OET/CHOICE2 (r=-.60), OET/BK'D (r=-.53), OET/ERR (r=-.74), NAR/BLOCKS (r=-.54), NAR/K% (r=-.67), NAR/E% (r=.51), NAR/KE (r=-.68).

a) Expected Relationships:

1. OET / ACES, r=-.71

Being distracted by the surroundings can cause one to become overloaded and confused thereby causing an athlete difficulty in narrowing attention. A narrow attentional focus is necessary for a closed or finite skill such as serving in volleyball. Consequently, a negative relationship between OET and ACES would be expected.

2. OET / CHOICE2, r=-.60

Being overloaded and distracted by external stimuli can cause the athlete difficulty in receiving the ball and making a good pass to the setter. Receiving where a receiver zeros in on the ball and makes a pass to the setter, is considered a closed skill, therefore, a negative relationship between OET and CHOICE2 would be expected.

3. OET / CHOICE1, r=-.50

It is expected that being overloaded by external stimuli would cause confusion and difficulty when one is required to focus on a particular situation. Receiving, where one must zero in on the ball and make an effective pass to the setter, is considered a closed skill. Therefore, a negative relationship between OET and CHOICE1 would be

expected.

4. NAR / ERR%, r=.51

The male athlete tended to hit the ball out of the court or into the blocker when the athlete was in a narrow attentional focus. A broad focus of attention is required in order for a player to be aware of what is happening around him; such as by detecting changes in positioning or spotting openings. It appears logical that proficient attackers would be good at broadening their attention. Consequently, a relationship between NAR and ERR% would be expected.

5. NAR / KILL EFF., r=-.68

The male athlete scored frequently, when he did not narrow his attention, as opposed to hitting out or into the block. It seems logical that good attackers would be more proficient at broading their attention to include the possibility of directing the ball than if the athlete focused on one offensive strategy. A negative relationship between NAR and KILL EFF. would be expected.

6. NAR / BLOCKS, r=-.54

One would expect good blockers to be proficient in broadening their attention at a high level of competitive

play. A broad focus of attention is necessary for coping with strategies. Narrowing his/her attention when approaching a block can catch the blocker off guard if the opposing team alters the attack. Consequently, a negative relationship between NAR and BLOCKS would be expected.

b) Unexpected Relationships:

1. OET / BLOCKED, r=-.53

This high negative correlation was unexpected because it would seem logical that a player overloaded and distracted by external stimuli would tend to overlook the opponent's defensive strategy while attacking and would more frequently be successfully blocked than a player who is not distracted by external events. No plausible explanation is presently available for this observation.

2. OET / ERR, r=-.74

This high negative correlation was unexpected because it would seem logical that a player overloaded and distracted by external stimuli would be careless in serving and thus make more errors than a player not distracted by external events.

It is possible that the high negative correlation is due to those players who more frequently execute more "aces". It is also possible that these same players would

tend to have more errors if they frequently attempt ace serves. There appears to be a tendency that for persons inclined to serve aces to also be inclined to make errors.

3. NAR / KILL%, r=-.67

This high negative correlation was unexpected because generally a player who narrows his attention, concentrating on one form of attack than another, would not be aware of what was going on around him/her and overlook other attacking possibilities. Conversely, one who was focusing on more than one person or more than one form of attack would likely be aware of other options. No explanation is presently available for this occurrence.

Overview

The purpose of this study was to determine whether or not relationships exist between selected attentional scales, as measured by the TAIS, and performance indices in basketball and volleyball.

Generally, the hypotheses, as stated in Chapter 1, revolved around the concept that attentional focus is an integral part of athletic performance and, because of this interdependence attentional focus should correlate with actual performance. As there are different kinds of attentional foci, and different kinds of performance situations which require fairly specific foci of attention,

it was hypothesized that the two effective attentional foci (BET and NAR) would correlate well with the positive performance indices (e.g. total points in basketball or kills in volleyball); and that the two ineffective foci (OET and RED) would correlate well with the negative performance indices (e.g. turnovers in basketball or errors in service in volleyball). [3]

The general hypotheses were partially supported by the results of this study. Specifically, the results of the Pearson product-moment correlations indicate a substantive relationship between attentional style, as measured by the TAIS, and particular performance indices of actual performance in basketball and volleyball as summarized below:

(1) The findings of greatest interest to female basketball were the result of the Pearson product-moment correlations which showed moderately strong relationships between OET and total points (r=-.59), NAR and total points (r=.70), NAR and rebound percentage (r=.72) and RED and free-throw shooting (r=.78).

(2) The finding of particular interest to male basketball was the result of the Pearson product-moment correlation which showed a moderately strong negative relationship between OET and free-throw shooting (r=-.57).

(3) The finding of greatest interest to female volleyball was the result of the Pearson product-moment

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[3]A list of specific focus/performance hypotheses can be found in Appendix A

correlation which showed moderately strong relationships between BET and aces (r=-.51), NAR and OUT (r=.50) and NAR and SUM (r=.51).

(4) The findings of greatest interest to male volleyball were the result of the Pearson product-moment correlation which showed moderately strong relationships between OET and ACES (r=-.71), NAR and BLOCKS (r=-.54), NAR and KILL percentage (r=-.67), NAR and Error% (r=.51), and NAR and Kill efficiency (r=-.68).

The correlations in this study examining the TAIS are not compared to other related findings as no such studies exist which use the same variables. However, the data collected by this study indicate that relationships exist at substantive levels between certain attentional subscales of the TAIS (e.g. BET, OET, NAR, and RED) and particular performance indices of actual performance in basketball and volleyball.

The major findings of this study are supportive of those reported by Nideffer(1976b), Landers et al. (1981) and Van Schoyck & Grasha (1981). For instance, Nideffer (1976b) reported that regular swimmers were less likely to become overloaded with internal and external stimuli than novice swimmers. Landers et al. (1981) found no significant differences between open - skill shooters and closed - skill shooters in terms of the width or directional components of their attention. However, the study found that experienced shooters were not frequently overloading with external

information, and seldom made performance errors as a result of overly narrowing attention. Van Schoyck & Grasha's (1981) found that OET and OIT negatively correlated with match play ratings of tennis players. The results from the present study also indicate that OET (an ineffective attentional focus) is consistently negatively correlated with performance indices in basketball and volleyball. Accordingly, these results partially support or relate to the foregoing findings.

An examination of the results of the four individual teams tended to show that the expected relationships did occur.

Finally, an examination of the unexpected correlational relationships which occurred for the female and male basketball teams as well as with the male volleyball team may be due to the lack of "specificity" inherent in the NAR and RED scales. Because no unexpected relationships occurred with the female volleyball team, one could speculate that, in subsequent investigations, the hypotheses to be tested should be defined in a more sport-specific and/or gender-specific context; i.e., the kind of sport and the gender of its performers should more carefully be taken into account since comparative investigations of male basketball may not have any relevance to female volleyball.

Chapter V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this study was to explore the relationship between the selected scales BET, OET, NAR, RED (as measured by the TAIS) and various indices of actual performance by female and male basketball and volleyball players. Attentional style is considered to be a personality variable (Nideffer 1976b). Nideffer proposed that attention can be dichotomized on two dimensions. One of the two dimensions extends itself on an internal-external continuum. The focus of attention can consequently be directed within the individual or at the external environment. Since attentional style varies with each athlete, it seems that individuals are likely to differ in attentional capacities. One of the major premises upon which the present study was based is on Nideffer's (1981) theory that each sport has a different attentional demand. It appears that attention must be shifted or altered when necessary to meet the various requirements of a particular sports attentional demands.

Forty-two varsity basketball and volleyball players (N=21 female, N=21 male) of ages 17-23 from the University of Alberta served as subjects for this study. Each subject completed the Test of Attentional and Interpersonal Style. The subjects' performance data for the 1984-85 season and four attentional TAIS scores were analyzed using Pearson Product-Moment correlations.

The general hypotheses of this study were to test whether or not relationships existed between each of four attentional scales of the TAIS and each of the various indices charted for the two sports selected. The specific hypotheses tested can be found in Appendix A.

The results of the study suggested, in part, the following conclusions:

1. In female basketball, the NAR scale related positively to total points and rebound percentage and RED to free-throw performance. This would tend to support the general view that a narrow external focus of attention is required for task execution in these three aspects of performance in basketball.
2. In male volleyball, (OET) (i.e. external overload) is negatively related to service aces and in allowing the setter two choices in passing the ball. One could conclude that being distracted interferes with service and passing performance.
3. Generally, the four attentional scales used in this study can be seen to be related to performance in volleyball and basketball. Whether or not this relationship can be analytical in nature remains to be seen.

Attempts were also made to note and examine general trends in the data. The results of the Pearson product-moment correlations, for instance, indicated that certain attentional styles (as measured by the TAIS) and the performance indices charted for basketball and volleyball

are significantly or moderately related. The information obtained by the study suggest, however, that a larger sample size and the utilization of all of the attentional scales may improve analytical accuracy if the TAIS is to be used to measure attentional style with basketball and volleyball players. It is equally possible that the open skill structure of the two sports chosen for this study would make it difficult to establish foci necessary for different performance situations. The study gives further credence to the generally accepted positions proposed by Nideffer (1981) regarding mental sets for athletic performance. It is therefore advisable that subsequent research along these lines take a more definitive stance. Such studies would need to define and monitor those factors that most significantly influence performance since these factors would affect 1) the selection of the TAIS scales, 2) the type of sporting event, 3) the gender of the participants, and 4) the level of competition.

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Appendix A

In order to test this general hypothesis, the following specific hypotheses were tested.

A. In Female Basketball:

a) BET would be positively correlated with personal fouls.

b) OET would be negatively correlated with total points.

c) OET would be positively correlated with personal fouls.

d) NAR would be positively correlated with total points.

e) NAR would be positively correlated with rebounds.

f) RED would be negatively correlated with free-throw shooting.

g) RED would be negatively correlated with total points.

h) RED would be negatively correlated with rebounds.

B. In Male Basketball:

a) BET would be negatively correlated with turnovers.

b) OET would be negatively correlated with free-throw shooting.

c) OET would be negatively correlated with field-goal shooting.

C. In Female Volleyball:

a) BET would be negatively correlated with aces.

b) BET would be negatively correlated with blocks.

c) NAR would be positively correlated with out.

d) NAR would be positively correlated with sum.

e) NAR would be positively correlated with Choice3.

f) NAR would be negatively correlated with Err/serv.

D. In Male Volleyball:

a) OET would be negatively correlated with aces.

b) OET would be negatively correlated with Choice2.

c) OET would be positively correlated with blocked.

d) OET would be positively correlated with err.

e) NAR would be negatively correlated with kill efficiency.

f) NAR would be negatively correlated with blocks.

g) NAR would be positively correlated with error%.

h) NAR would be negatively correlated with kill%.

Table 1 - Panda Basketball Team 1984:
Correlational Matrix of TAIS Subscales with Performance Indices

	BET	OET	NAR	RED	GP	FG%	FT%	TP	RB%	TO	PF
BET					.42	.43	.00	.43	.15	.47	.50
OET					-.42	-.21	-.03	-.59	-.24	-.42	-.53
NAR					.42	.27	.09	.70	.72	.42	.48
RED					.26	.09	.78	.52	.52	.41	.38
GP	.42	-.42	.42	.26							
FG%	.43	-.21	.27	.09							
FT%	.00	-.03	.09	.78							
TP	.43	-.59	.70	.52							
RB%	.15	-.24	.72	.52							
TO	.47	-.42	.42	.41							
PF	.50	-.53	.48	.38							

Appendix B

Table 2 - Golden Bears Basketball Team 1984:
Correlational Matrix of TAIS Subscales with Performance Indices

	BET	DET	NAR	RED	GP	FG%	FT%	TP	RB%	TO	PF
BET					-.07	.25	-.21	-.16	-.10	-.60	-.40
DET					-.00	.49	-.57	.02	.12	.01	-.07
NAR					-.57	-.44	-.03	-.10	-.10	-.33	-.47
RED					-.12	.12	-.25	.14	.06	.20	-.27
GP	-.07	-.00	-.57	-.12							
FG%	.25	.49	-.44	.12							
FT%	-.21	-.57	-.03	-.25							
TP	-.16	.02	-.10	.14							
RB%	.10	.12	-.10	.06							
TO	-.60	.01	-.33	.20							
PF	-.40	-.07	-.47	-.27							

Table 3 - Panda Volleyball Team 1984:

Correlational Matrix of TAIS Subscales with Performance Indices

	BET	OET	NAR	RED	ATTS	KILLS	CONT	OUT	BK'D	BKS	DIGS	ACES	ERR	C3	C2	C1	CO	SUM	K%	E%	KE	EPS
BET					-.26	-.30	.17	-.30	-.23	-.49	-.11	-.51	-.36	-.20	0	.0	-.27	-.16	.23	.41	-.25	-.01
OET					-.35	.26	-.43	-.22	-.35	-.43	-.29	-.12	-.35	-.25	0	.0	-.34	-.26	.30	.28	.01	.20
NAR					.49	.47	.45	.50	.44	.24	.45	-.07	.24	.48	0	.0	.43	.51	.20	.17	.08	-.48
RED					-.11	.01	-.27	.08	-.12	-.05	-.27	-.07	-.01	-.02	0	.0	-.01	.0	.20	.27	-.04	-.31
ATTS	-.26	-.35	.49	-.11																		
KILLS	-.30	-.26	.47	.01																		
CONT	-.17	-.43	.45	-.27																		
OUT	-.30	-.22	.50	.08																		
BK'D	-.23	-.35	.44	-.12																		
BKS	-.49	-.43	.24	-.05																		
DIGS	-.11	-.29	.45	-.27																		
ACES	-.51	-.12	-.07	.07																		
ERR	-.36	-.35	.24	-.01																		
C3	-.20	-.25	.48	-.02																		
C2	.00	.00	.00	.00																		
C1	.00	.00	.00	.00																		
CO	-.27	-.34	.43	-.01																		
SUM	-.16	-.26	.51	.00																		
K%	.23	.33	.27	.28																		
E%	.41	.28	.17	.27																		
KE	-.25	.01	.08	-.04																		
EPS	-.01	.20	-.48	-.31																		

Table 4 - Golden Bears Volleyball Team 1984:

Correlational Matrix of TAIS Subscales with Performance Indices

	BET	OET	NAR	RED	ATTS	KILLS	CONT	OUT	BK'D	BKS	DIGS	ACES	ERR	C3	C2	C1	CO	SUM	KX	EX	KEF	EPS
BET					-.13	-.18	-.17	.15	.12	-.13	-.16	-.10	.09	.01	-.10	-.15	-.08	-.01	-.18	.25	-.25	.26
OET					-.44	-.47	-.35	-.42	-.53	-.16	-.33	-.71	-.74	-.45	-.60	-.50	-.30	-.48	-.09	-.41	.22	.27
NAR					-.15	-.25	-.14	.17	-.18	-.54	-.14	-.45	-.13	-.12	-.18	-.01	.03	-.13	-.67	.51	-.68	.01
RED					-.28	-.26	-.29	-.30	-.37	-.29	-.24	-.39	-.43	-.09	-.27	-.11	-.01	-.13	-.05	.15	-.12	.09
ATTS	-.13	-.44	-.15	-.28																		
KILLS	-.18	-.47	-.25	-.26																		
CONT	-.17	-.35	-.14	-.29																		
OUT	.15	-.42	.17	-.30																		
BK'D	.12	-.53	-.18	-.07																		
BKS	-.13	-.16	-.54	-.29																		
DIGS	-.16	-.33	-.14	-.24																		
ACES	-.10	-.71	-.45	-.39																		
ERR	.09	-.74	-.13	-.43																		
C3	.01	-.45	-.12	-.09																		
C2	-.10	-.60	-.18	-.27																		
C1	-.15	-.50	-.01	-.11																		
CO	-.08	-.30	.03	-.01																		
SUM	-.01	-.48	-.13	-.13																		
KX	-.18	-.09	-.67	-.05																		
EX	.25	-.41	.51	.15																		
KEF	-.25	.22	-.68	-.12																		
EPS	.26	.27	.01	.09																		